3 ISSUES

Economic Issues

- **Road Maintenance funding is not adequate to maintain the current Forest Service road system to standard (i.e., all Forest roads).**

- **Future funding trends indicate that Road Maintenance funding will not be adequate to maintain the *Key Forest Routes* to standard. The Key Forest Routes/Roads** (identified as *primary* and *secondary* in the Siuslaw Access and Travel Management [ATM] Guide) **are believed to represent the minimum road system needed for public and administrative access.**

Current Situation

During the early 1990s, reductions in timber harvest and corresponding reductions in maintenance and repair budgets associated with timber sales highlighted the need to reduce overall miles of maintained roads. It was apparent from an economic standpoint that projected budgets for maintenance and needed repairs of the Forest road network would not meet the needs of the extensive road system. In addition, as management direction changed from an emphasis on timber commodity production to protection and restoration of wildlife and fish habitat, the Forest recognized that the existing road system would quickly become a liability to resources if not properly maintained.

Much of the Forest road budget came from congressionally allocated budgets but a large portion also came from cooperative deposits associated with timber sales. By the early 1990s the allocated and cooperative funds were reduced by about 75% of previous budget totals for road maintenance. The reduction in timber sales also caused an almost immediate halt in new road construction and reduced the ability to use timber-generated funds for reconstruction and repair of the existing system. This trend of reduced timber funding opportunities and redirection of management priorities led to the initial strategy of Key Road selection implemented by the ATM guide in 1994. The budgets in subsequent years have continued to decline leading to reduced maintenance and a need to prioritize the distribution of available maintenance funds to the Key Road system.

In recognition of the potential resource damage inherent in a poorly maintained road system given the high precipitation in Oregon's coastal mountains, roads not selected as part of the Key Road system were stabilized by constructing fairly deep diagonal water bars across the road surface, thus allowing water to drain off the roads when culverts eventually plugged due to lack of maintenance. In most cases those roads that were not regularly driven by high clearance vehicles became overgrown with brush and down trees in less than five years due to the rapid growth of vegetation and regular windstorms common in the Coast Range. It was expected the stabilized roads would be resistant to washouts and fill failures since the waterbars were designed to remove water from the road surface regardless of rainfall intensity.

This strategy was tested by the winter storms of 1996 and 1997 that caused extensive damage to the Key Road system with almost no effect on the waterbarred, stabilized roads. About half the damage to Key Roads resulted from overflowing culverts and flooded streams washing out road segments and damaging road surfaces; the other half from slumps and fill failures.

This is partly due to the difference between most Key Roads and those that sustained little damage. The majority of waterbarred and stabilized roads are fairly short dead-end spurs accessing timber harvest units and project sites while the Key Road system is mostly comprised of older roads that were in place prior to 1970. Many of the Key Roads are valley bottom and mid-slope roads with high numbers of stream crossings and culverts. Key Roads are also more costly to maintain since they are more difficult to stabilize, more prone to winter storm damage, and more traveled by both public and forest management traffic. The existing road system is a combination of Key Roads that receive prioritized maintenance and stabilized roads that are not regularly maintained.

Current budget allocations do not provide adequate funding to maintain even the Key Road network to established standards. The limited maintenance funds allocated to the Key Road system have been focused on ditch line and drainage clearing, brushing roadsides to maintain visibility, and road surface treatments. Additional maintenance of the Key Roads and maintenance of the non-Key Roads is deferred. More significant needed repairs of failing road surfaces, failing cut and fill slopes, major resurfacing, and signing have been deferred. Periodic surveys of the deferred maintenance needs reveal there are millions of dollars in repairs not being accomplished. The current situation is that of a Key Road system receiving reduced maintenance, a stabilized system of non-Key Roads, and a backlog of deferred maintenance on both Key and non-Key Roads. Although decommissioning and stabilizing non-Key Roads have reduced the overall miles of maintained system roads, current and expected budget allocations are still far below funds required to adequately maintain the existing road system.

Table 2. Road maintenance cost comparison.

ROAD SYSTEM	MILES	ANNUAL MAINTENANCE COST (FULL COST)[1]	DEFERRED MAINTENANCE COST[2]
Key Roads	770	$3,762,000	$17,917,000
Non Key Roads	1,510	$2,494,000 (Not currently maintained)	$6,917,000
Total	2,275	$6,256,000 (If all miles maintained to standard)	$24,824,000

[1] Full cost includes both custodial maintenance and periodic surfacing replacement. Does not include drainage structure replacements.

[2] Deferred Maintenance includes deficiencies identified by field surveys (1997-2002) in accordance with national road standards protocol (Stokes 2002).

Table 2 summarizes the cost to maintain the current road system to standards, and the deferred maintenance costs for repairs. Annual maintenance costs were calculated for paved and gravel roads by cost per mile; then totaled for the key and non-key system roads. Deferred maintenance costs are based on road surveys from 1999 through 2002.

The 2002 budget allocation for road maintenance is $767,000 dollars or about 22% of the needs for the Key Road system. There are no regular budget allocations for deferred maintenance at this time.

Risks and Benefits

Potential risks associated with reduced or limited road maintenance are decreased user safety and increased resource damage. Smaller routine maintenance budgets result in less road brushing, surface maintenance and signing, which decrease visibility, driving comfort and directional information. Less ditch line and culvert cleaning increases the likelihood of water damage to road surfaces and increased sedimentation into aquatic systems. Deferred maintenance on road segments that have deteriorated over time contributes to unsafe use of the roads and potential for catastrophic damage resulting from storm events.

"Low clearance" Key Forest Road

The benefit of prioritizing limited maintenance funding is that available funds can be used on the areas of highest public road use and locations that have a higher risk of road system and environmental damage. Documenting maintenance shortfalls and inventorying long-term needs helps prioritize projects where project needs exceed funding sources.

Desired Future Condition

A minimum Forest transportation system that safely and efficiently serves current and anticipated management objectives and public uses. A balance of routine and deferred maintenance funding maintains this system, which meets public uses and resource protection objectives.

Available funding is primarily allocated to the Key Road system. Roads not a part of the Key Road system are maintained by project-associated funds commensurate with project use.

Recommendations

- Use the Key Road system as basis for making site-specific road management decisions. If needed, adjust the system to meet changing needs and conditions over time.
- Inventory annual and deferred maintenance needs of the Key Forest Road system. Prioritize road maintenance work to ensure resource protection and user safety within current and anticipated Forest budgets.
- Consider alternative funding sources for road maintenance and repair. Examples include:
  - ⇨ Internal funding programs to supplement maintenance budgets in order to meet minimum maintenance standards.
  - ⇨ Cooperative agency funding and grants for improvements to the Key Road system resulting in improvements to fish and aquatic habitat.
  - ⇨ Partnerships with other road management agencies, local communities and user groups.
  - ⇨ Special Use and Road Use Permits for the maintenance of project roads during periods of use by non-Forest Service users. Permits identify maintenance to be performed by permittees commensurate with use.

Access and Community Impact Issues

Issue

- **The current Forest road system provides access to public lands but funding has not kept pace with maintenance needs.**

- **Local communities and businesses may depend on Forest roads as alternate access routes between rural communities and emergency evacuation routes.**

- **People and communities who depend on Forest roads will be affected as access to many areas of the Forest becomes limited. Creative ways to reduce costs and maintain roads should be developed.**

Current Situation

Community impacts in relation to declining maintenance funding and reduced open road access were addressed in the Siuslaw National Forest Access and Travel Management analysis in 1994 (see Appendix B, page 59). The analysis developed a process for identifying a network of **Key Forest Roads** as a means of reducing costs and applying limited funds to roads most vital to communities and long-term management of the Forest.

The question to be answered in relation to the issue of community impact is:

> ***Can the process for identifying, maintaining, and managing the network of Key Forest Roads in the 1994 Access and Travel Management Guide be brought forward as a key result of the 2003 Roads Analysis?***

The 1994 Access and Travel Management analysis included extensive public involvement that resulted in contacts with the general public and local communities, as well as state, county, and local road agencies. The information, concerns, and access needs collected from this effort were analyzed and are incorporated into the process of selecting and managing the network of Key Forest Roads. This process is based on categorizing each national forest system road into one of three categories:

"High clearance" Key Forest Road

Primary Road

Primary roads are to be kept open and are first priority for maintenance funding. These roads are typically maintained to safely accommodate passenger cars.

Secondary Road

Secondary roads make a direct single connection to management areas outside the reach of primary routes. These roads are typically managed at a lower maintenance standard than a primary road.

Roads other than Primary or Secondary

These roads will be considered for lower maintenance standards, restricted access, closure, or decommissioning during watershed or project level analysis.

The Access and Travel Management analysis recognized that people and local communities depend on some Forest roads more than others. The primary and secondary selection criteria were developed as a means to identify and prioritize maintenance for roads vital to local communities. These are the priority roads that connect public roads, provide access to communities, connect land in other ownerships, and are first to receive funding to address the safety of road users.

The 1994 Access and Travel Management analysis resulted in the following criteria for the selection of the network of Key Forest Roads:

Primary Route Selection Criteria:

- ❶ Roads that link state and county roads, which connect high-use entry points or population centers and provide major access into and through the Forest.
- ❶ Among primary road alternatives, select the one that favors the greatest use of state and county road systems (these are usually double-lane roads and highways).
- ❶ Roads that help provide the most extensive linkage to secondary networks.
- ❶ Roads that are designated scenic routes or auto tours.
- ❶ Roads that provide access to recreation areas, which contain a number of developed sites and facilities

Secondary Selection Criteria:

- ❷ Roads that give the best access to management areas outside the proximity of the primary network, considering that these areas or project sites cannot be accessed by short-term, temporary roads, or by means other than highway vehicles.
- ❷ Routes that extend primary Forest roads as well as state and county roads, and give needed long-term access.
- ❷ Long-term roads with only periodic or seasonal restrictions.
- ❷ Roads that access developed sites, wilderness trailheads, multiple resource management areas, and special sites and facilities that require permanent vehicle access.
- ❷ A single road selection from alternative routes to the same area, site or destination that will generate the least amount of negative resource impacts (*e.g.,* selecting a ridge-top road over one within a riparian zone that meets the same destination access needs).
- ❷ Long-term roads that are supported by cooperative share-cost agreements or other partnerships and open to public travel.

The process outlined in the 1994 ATM Guide was evaluated based on Road Analysis Questions GT(1-4) page 50 and SI(6), page 55 to determine whether it is still valid based on these questions.

Conclusion:

It was found that the ATM process, as described and updated in this document, is functioning well.

Risks and Benefits

As maintenance budgets continue to decrease, there is a risk that road safety deficiencies will increase over time. As these roads deteriorate over time, local communities and businesses that depend on these roads for access or as emergency evacuation routes may suffer.

Medical response time is also greatly increased in areas with limited access. Should a medical emergency occur, treatment and evacuation of people using the Forest (*e.g.,* by hiking, hunting, fishing, gathering of forest products) would decrease in efficiency with a decrease in road density.

The benefit of identifying and managing the network of Key Forest Roads is that it prioritizes funding to those roads most important to the local communities. The maps of Key Forest Roads (Appendix C) display the priority road network in a way that is easily understood by the public as well as forest management specialists.

Desired Future Condition

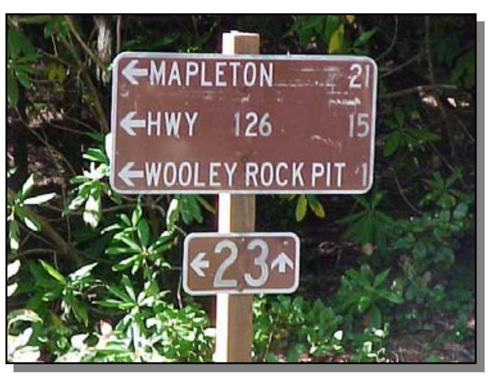
The Forest transportation system provides key access routes through the Siuslaw National Forest within current budget allocations. Responsible officials coordinate with other public agencies and private stakeholders to identify and integrate current access needs and balance these with transportation system costs.

Recommendations

- Use the Key Road system as the basis for making site-specific road management decisions. If needed, adjust the system to meet changing needs and conditions over time.
- Maintain access to private lands.
- Maintain linkages between State Highway 101 and the county road system, as well as the east-west flow of local community and emergency traffic over the Oregon Coast Range.

  If budget shortfalls limit maintenance of the Key Forest Road system to standard, consider site-specific maintenance as problems arise. For example, risks to public safety can be mitigated by clearing brush along hazardous routes, spot rocking damaged road surfaces, or by signing critical junctions until full maintenance can be accomplished.
- At the district or appropriate scale, consider whether the Key Forest Roads meet current public access needs.

  If such needs are not addressed by the current Key Road system, adjustments or modifications to the Key Road system can be addressed at the watershed/project scale analysis.



Typical directional signing on Key Forest Roads

Environmental Issues

The Forest Road system affects the basic resources of soil, water, fish, wildlife, and vegetation. Access to prime habitat areas can increase the vulnerability of animals and cause a re-distribution into less desirable areas. These same travel ways also provide access for recreation and resource management projects. Human access into remote areas can disturb wildlife and sensitive plants. While these effects are addressed in general terms in this analysis, they are considered in more detail at the watershed/project level.

Aquatics and Water Quality

Roads can affect streams in a variety of ways. The potential for landslides can be increased, both fine and coarse sediment input may be increased, subsurface flow can be intercepted and rerouted through ditches and culverts, low-gradient streams may be constricted in valley bottoms by the presence of roads, the movement of large woody debris from upper hillslopes to valley bottoms can be interrupted by mid-slope roads, and riparian vegetation can be affected.

Issue

◈ **Roads can increase the potential for landslides.**

Current Situation

In the Oregon Coast Range, road-related landslides are usually debris flows, which flow down high gradient stream channels. Depending on the volume of the material, the valley configuration, and the angle of stream confluences, these debris flows can travel long distances, and may reach perennial, low gradient streams. Debris flows occur naturally but the presence of roads can increase the potential for occurrence in moderate size storms.

On the Siuslaw National Forest, risk factors for road related landslides include mid-slope roads, roads built using side-cast techniques where unstable fill can become saturated and fail, and undersized culverts that can become plugged and cause water to be diverted out of a stream channel.

Until the early 1970s, Forest roads were commonly built using side-cast techniques, where excavated material was simply pushed over the side of the road to create the shoulder. As a result, the roads with the higher risk of landslides tend to be the older roads, which are often in the Key Forest Road system. These older roads also tend to have undersized culverts that are more likely to plug with debris.

Beginning in the early 1990s, all roads on the Siuslaw National Forest were inventoried and surveyed for problem areas, and culvert locations. In addition, all culverts were inventoried, and problems and diversion potential were documented in 1995. This information is available on the GIS system. More information and recommendations were provided by watershed analyses.

Risks and Benefits

Mid-slope roads crossing streams on steep ground that receive little or no maintenance are at the highest risk of debris flows. Debris flows originating at roads tend to have very little large woody debris input into streams. While they can add gravels to low-gradient streams, which could be considered a benefit in gravel-deficient streams, the debris flow input can have short-term detrimental effects, such as aggrading the stream bed, filling in pools and covering existing spawning gravels with fine sediment.

Many of the roads at high risk for landslides have already been closed or decommissioned on the Siuslaw National Forest; however, some roads, especially those that will remain open, continue to be at risk.

Stabilized mid-slope road

Desired Future Condition

Mid-slope roads located on steep slopes with multiple stream crossings are either:

1) Closed, with the stream crossing culverts and fills removed and the road bed and fills stabilized; or

2) Stabilized with upgraded culverts.

Recommendations

- Follow recommendations of watershed analyses and the Forest Restoration Plan (USDA 2002).
- Identify the roads that are still at a high risk of landslides. If they are part of the Key Road system stabilize them; if they are not, consider them for closure or decommissioning.

  Tools useful in this analysis are:

  - ⇨ Watershed analyses.
  - ⇨ Slope stability maps that identify steep, concave slopes. These maps were generated for specific watershed analyses.
  - ⇨ The debris flow models created by the CLAMS project. These maps show areas where debris flows are likely to originate, and how far the debris flow will travel.
  - ⇨ The Forest culvert inventory that shows the location and diameter of culverts.
- During project planning, identify roads that will not be needed and close or decommission them.

◈ **There is a potential for increased input of fine and coarse sediment into streams from roads.**

Issue

Current Situation

In the Oregon Coast Range, the dense vegetation cover and high infiltration rate of soils results in low to non-existent surface erosion in natural areas. Surface erosion from roads can occur where steep, unvegetated cut slopes are present, in ditch lines (especially those with a moderate to steep gradient), and from roads with no gravel or asphalt.

Depending on the type of bedrock, some areas of the Coast Range have a higher potential for erosion and generation of fine sediment. Generally, areas underlain by basalt generate less fine sediment while areas underlain by fine siltstones (such as areas around Hebo) generate more.

Sediment generated from roads may or may not reach stream channels. Sediment diverted off the road and out of ditches by water bars is usually deposited on the slope below the road and does not reach stream channels. Sediment that travels down ditches may reach live stream crossings where it enters the stream system or is carried through a cross-draining culvert and deposited on the hill slope below the road.

Risks and Benefits

Increased fine sedimentation can cover spawning beds. Although many of the roads on the Siuslaw National Forest have been waterbarred, and most have a rocked surface (which reduces the fine sediment production), some roads still have the potential to produce fine sediments.

Desired Future Condition

Roads with a high potential to produce fine sediment have been treated to reduce fine sediment deposition into streams.

Recommendations

Stabilized, non-Key Forest Road

- Follow recommendations of watershed analyses and the Forest Restoration Plan (USDA 2002).
- Leave ditches vegetated as often as possible. Vegetation acts as a filter and reduces the amount of fine sediment that reaches stream crossings.
- Provide an adequate covering of rock on roads that will remain open.
- Restrict timber haul to the dry season on roads prone to sedimentation. If timber haul must take place during the wet season, monitor rainfall, and reduce or eliminate timber haul during rain events. (See Siuslaw Road Rules, USDA 1998b.)
- Install and maintain surface crossdrains (*e.g.,* waterbars, grade dips, outslope drains, *etc*.) on roads not designated for passenger cars.

Issue

◈ **Roads can intercept and re-route subsurface flow resulting in increases in peak flows, and in changes in the timing of storm runoff to streams.**

Current Situation

Mid-slope and valley bottom roads can intercept subsurface flow. On the Siuslaw National Forest, most valley bottom roads are either county roads or private roads. Many of the mid-slope roads have been decommissioned. Those that remain can still intercept the subsurface flow from cut banks and re-route it through ditches into cross-drains and stream crossings. During storms, ditch lines act as an artificial extension of the stream network, thereby increasing peak flows.

Risks and Benefits

Increased peak flows can alter stream morphology. Stream channels are formed by the “bankfull” flow, which is defined as the flow that fills the channel to the top of the banks, and is thought to have an average recurrence interval of 1.5-2 years. Increasing the flow may cause the channel dimensions to change, *i.e.,* get deeper and/or wider to accommodate the higher flows. In the Coast Range, this change will be hard to document because stream flows tend to be “flashy,” *i.e.,* they rise and fall quickly with rainfall events, and flows tend to be highly variable. For instance, North Creek, a tributary to Drift Creek of the Siletz River has low summer flows of 6.5 cubic feet per second (cfs), and a two-year flow of 390 cfs.

Desired Future Condition

Mid-slope roads are closed or stabilized. The fills and culverts of closed roads have been removed to prevent landslides and stream diversions, and the road surface waterbarred to allow water intercepted by cut banks to flow across the road and into the slope below the road.

Recommendations

- Follow recommendations of watershed analyses and the Forest Restoration Plan (USDA 2002).
- Close and decommission unneeded mid-slope roads.
- Install and maintain surface crossdrains (*e.g.,* waterbars, grade dips, outslope drains, *etc.*) on secondary high clearance roads to allow water from the ditch line to travel across the road surface to the slope below. This would dissipate water intercepted by cutbanks and prevent it from being delivered directly to stream channels.
- Disconnect road system from stream channels by waterbarring roads wherever possible. This would deliver water as naturally as possible to the slope below the road rather than concentrating runoff along ditch lines to the nearest stream, thereby extending the stream network artificially.

◈ **Roads can alter the geomorphology of streams and floodplains.**

Issue

Current Situation

Roadbeds located in valley bottoms can reduce the width of the floodplain and constrict the area across which the stream can meander. This situation can lead to placing riprap on the side of the road or on the stream bank to prevent the stream from undercutting the road. Stream velocities tend to be higher near banks with riprap than those with vegetation, since riprap is a hard surface that doesn’t absorb the stream’s energy in the same way as vegetation. As a result, bank erosion downstream from riprap can increase. Riprap also doesn’t provide habitat for fish and riparian species.

On the Siuslaw National Forest, most valley bottom roads are either private or county roads because of the history of homesteading in the valley bottoms. Therefore, decommissioning or re-routing these roads will take cooperation between the Forest Service, other agencies and governments, such as counties, and other landowners.

Risks and Benefits

Roads that impinge on low gradient stream channels impede channel migration and the processes of erosion and deposition, and habitat creation associated with migrating channels. Also, the roadbed is at risk of erosion, which usually requires bank stabilization measures, such as riprap.

Desired Future Condition

Roads do not impede stream channel movement.

Recommendations

- Follow recommendations of watershed analyses and the Forest Restoration Plan (USDA 2002).
- Forest roads adjacent to low-gradient streams and floodplains should be relocated or decommissioned. Work with the county governments and willing landowners to relocate easements or rights-of-way.

Issue

◈ **Mid-slope roads can interrupt the movement of large woody debris from upper hillslopes to valley bottoms.**

Current Situation

In the Oregon Coast Range, much of the large woody debris in low gradient streams is deposited by debris flows from high-gradient tributaries. Over time, these woody debris deposits create complex aquatic habitat. Mid-slope roads that cross high-gradient tributaries can act as barriers between the source areas of debris flows and woody debris and the low gradient streams. Wood and sediment can become trapped behind stream crossings, reducing downstream delivery and increasing the risk of road failures.

Risks and Benefits

With existing mid-slope roads located on steep ground that have not had stream crossing fills and culverts removed, the possibility of debris flows occurring upslope and depositing wood and sediment at the road crossing still exists. Potential detrimental effects include: reducing the amount of wood that would otherwise reach the stream channel down slope, plugging the culvert at the road-stream crossing and diverting the stream channel's flow down the ditch, and/or road failure, resulting in a larger debris flow continuing down the channel.

Stabilized mid-slope road

Desired Future Condition

Few, if any, unstabilized mid-slope roads remain open. The fills and culverts of closed roads have been removed at stream crossings. If debris flows did occur upslope of a road location, the debris flow could continue downstream without incorporating the road fill.

Recommendations

- Follow recommendations of watershed analyses and the Forest Restoration Plan (USDA 2002).
- Identify mid-slope roads located on high-risk land for debris flows. If they are part of the Key Road system stabilize them; if they are not, consider them for closure or decommissioning. Seek alternative routes for Key Roads that cross unstable areas.
- During project planning, identify roads that will not be needed and close or decommission them.

Fisheries

The declining status of anadromous fish on the Siuslaw National Forest is of concern. Species at highest risk are those currently listed as threatened under the Endangered Species Act: the Oregon Coast coho salmon, Upper Willamette spring chinook salmon, and Upper Willamette winter steelhead. Also of special interest and considered sensitive by the Forest Service are coastal cutthroat trout, winter steelhead, spring chinook, and chum salmon. Other fish species include sculpins, dace, lamprey, mountain whitefish, suckers, northern pikeminnow, estuarine species like surfperch and starry flounder, and warm water fishes introduced primarily into lakes at the Oregon Dunes NRA. The Forest has about 1,200 miles of anadromous fish streams (all free-flowing), more than any other Forest in the contiguous U.S. It is also adjacent to the Pacific Ocean and includes a number of estuaries.

Roads influence the health and distribution of stream-dwelling species in several ways. When roads encroach directly on stream channels and adjacent riparian areas, natural stream processes are modified. Wood and sediment can be trapped behind stream crossings, reducing downstream transport and increasing risk of crossing failure. Road alignment and road fills can isolate floodplains, constrict the channel, constrain channel migration, and simplify riparian and aquatic habitat. Also, in some places, road encroachment can divert stream flows to the opposite bank, thereby destabilizing the hillslope and resulting in increased landslides. Construction and use of roads can lead to unwanted sediment and human activities, while culverts may often limit passage of aquatic organisms under roads.

- **Impacts of roads on riparian areas and fish habitat and populations include loss of streamside vegetation and shade; compaction or loss of floodplains; destabilization of steep slopes adjacent to streams; fishing; poaching; vandalism; and litter.**

Issue

Current Situation

Roads located in riparian areas have led to loss of shade and floodplain habitat, constriction of channel reaches, and provided easy access for removal of large instream or near-stream wood until policies changed in response to a wider range of ecosystem values in the 1990s. These types of impacts are fairly common on the Siuslaw NF outside of congressionally designated wilderness areas. Many of these situations were identified in watershed analyses over the last decade. As follow-up to watershed analyses many of these site-specific impacts have been or are currently being addressed. Some key stream reaches occupied by steelhead, chinook, and threatened coho salmon do not have roads in riparian habitat and serve as refugia that are likely to remain protected in the future.

Since most of the main rivers and many of the larger fish-bearing tributaries outside of congressionally designated wilderness areas have riparian roads, access for legal and illegal angling has increased. Poaching is a concern for at-risk species due to lack of state and Forest Service law enforcement capabilities, and increased access to streams where fish migrate, spawn and/or rear young.

As of 2002, the Siuslaw NF has not had a significant issue of accidental or intentional releases of non-native aquatic organisms (with the exception of warm water fishes which, for the most part, were introduced many years ago in lakes at the Oregon Dunes NRA). However, in those same lakes, non-native aquatic plants are of concern. Many of these introductions are tied to the road system. The road system does allow the State of Oregon to stock fish for recreational fishing. They use a combination of native and non-native salmonids, and have used fewer non-native stocks as ecological concerns about native aquatic species have increased.

A legacy of timber management prior to 1990 has left the landscape with many riparian roads and significant riparian areas that were clearcut to the stream bank. Many of the impacts were analyzed during watershed analysis. Stream temperature increases could only be explained by timber harvest, which involved riparian harvest and sometimes building of roads and even landings in riparian areas. This in turn has reduced the ability of streams to support native salmonids due to loss of habitat complexity. In some cases, where warmer temperatures occur, we have observed upstream movement of fish species associated with warmer stream temperatures (*e.g.,* redside shiners, pikeminnows, suckers).

Risks and Benefits

When roads are constructed adjacent to streams, riparian vegetation is often removed to accommodate the road right-of-way, improve visibility, and reduce any hazard of trees falling on the roadway. This action can reduce shading of the stream, however, causing increased stream temperatures, reduced potential for recruiting large woody debris in the stream, reduced leaf fall and riparian invertebrates, and loss of habitat for aquatic and riparian species. Another risk is from transport of chemicals or contaminants that could seriously damage aquatic life if (when) a truck accident occurs.

Not all areas have the same biological values. The first step of any recovery plan is to secure the best habitats and populations as much as possible. It is recommended that restoration efforts begin in refugia that have particularly good fish habitat and/or populations in order to protect these special resources (*e.g.,* through storm proofing of roads). The degree of acceptable risk of activities in such areas is lower and restoration priority is higher because these refugia are so critically needed for the recovery of fish runs. Determining the spatial coincidence of roads with such areas is a first step in determining if roads are affecting them. Roads in such areas may be a high priority for detailed examination and analysis to determine the extent of actual effects.

The road system facilitates access to streams, lakes and wetlands where at-risk species may live. Recreational use of aquatic resources, if improperly managed, can contribute significantly to declines in rare or unique native invertebrate populations or damage to important aquatic habitats.

Due to the significant road infrastructure on the Siuslaw National Forest, we know that the road system has altered the capacity of stream channels for large woody material. This is primarily due to undersized culverts easily plugged by woody material, or culverts failing due to age. It is less clear how much smaller sediment and organic matter is prevented from moving downstream due to culverts. The road system allowed removal of in-stream and near-stream large woody material prior to 1990, which has apparently **increased** stream energy and the resultant movement of sediment and organic matter downstream (as opposed to the issue about **prevention** of downstream movement). Effects of this reduction of hydraulic complexity should be studied in greater detail.

Stabilized, non-Key Forest Road

Desired Future Condition

The Forest's Ecosystem Restoration Strategy (USDA 2002) calls for "a stable adequately drained road system that provides access and allows for natural stream processes and passage of aquatic species." In particular, stream channels would be dynamic. They would migrate within historic flood plains, eroding the bed and banks in one place while aggregating the bed and building new banks in other places. Streams would also transport and deposit large pieces of woody debris and fine organic matter, providing physical structure and diverse aquatic habitat to the channel. Vegetation near streams would deposit nutrient inputs (*e.g.,* insects, leaves) and large woody material in the channels, while resultant shade would keep water temperatures relatively cool. A filter of plant material would prevent most sediment from entering stream courses; floodplains would be pervious and freely connected to channels; steep slopes adjacent to streams would be relatively stable; and evidence of behaviors such as poaching, vandalism, littering, and removal/trampling of riparian vegetation would be rare.

Recommendations

- Follow recommendations of watershed analyses and the Forest Restoration Plan (USDA 2002).
- During project planning, explore all reasonable options for reducing or eliminating impacts to coho salmon.

  This is in line with the National Marine Fisheries Service's request to eliminate or mitigate roads that pose risks to coho salmon recovery. It is recognized that this may not be feasible in cases where the road is an established travel route, and there are limited possibilities for relocating the road.
- Explore opportunities to reduce disturbance of coho salmon resulting from access to and use of dispersed areas.
- Explore options for learning about the effects of simplification of channel conditions at road crossings (*e.g.,* removal of roughness elements like large woody debris) on streamflows and fish habitat.

◈ Road construction, maintenance, and use may lead to excessive fine sediment entering stream channels.

Issue

Current Situation

Surface erosion occurs on most wildland roads because their surfaces, cutslopes, fillslopes and associated drainage structures are usually composed of erodible material and are exposed to rainfall and concentrated surface runoff. Surface erosion and associated sedimentation are highly sensitive to road maintenance practices, and small changes in road drainage configuration can markedly increase erosion and routing of eroded sediments.

In the Coast Range major channel changes, including noticeable aggradation, often occur during high flow events. The road system, as well as past timber units, was documented as contributing to stream aggradation at specific sites on the Forest after the floods of 1996, particularly in watersheds with high numbers of stream/road crossings.

Stabilized, non-Key Forest Road with vegetation encroachment

Risks and Benefits

Heavy use of roads during wet weather conditions, particularly from trucks hauling logs or gravel, can damage road surfaces and increase runoff of sediment into nearby streams. This occurs through rutting and resultant transfer of fine sediments from within the gravel to the surface of the road.

Culverts at road-stream crossings can cause large inputs of sediment to streams when hydraulic capacity is exceeded, or the culvert inlet is plugged and streamflow overtops the road fill. The result is often erosion of the crossing fill, diversion of streamflow onto the road surface or inboard ditch, or both.

On soils with moderate or high potentials for fine sediment, unstable soils, or steep slopes, roads may lead to excessive fine sediment entering stream channels. These “fines” are likely to settle in relatively low gradient, depositional sections of stream channels often favored as spawning sites by salmonid species. Fine sediments interfere with reproductive success by interrupting the ability of eggs to metabolize and/or smothering young fish that have not emerged from the interstitial spaces of spawning gravel areas.

Desired Future Condition

The Forest’s Ecosystem Restoration Strategy (USDA 2002) envisions “a stable adequately drained road system that provides access and allows for natural stream processes and passage of aquatic species.” In particular, any amounts of sediment from roads and road-related activities are small, and a filter of plant material prevents most of it from entering stream courses.

Recommendations

- Follow recommendations of watershed analyses and the Forest Restoration Plan (USDA 2002).
- Identify roads chronically increasing fine sediment in aquatic habitat and take corrective action (*e.g.,* closure, decommissioning, upgrading).
- Identify roads that pose a high risk of landslides (a source of fine sediments) and take corrective action (*e.g.,* closure, decommissioning, upgrading).
- Create an inventory of all road-stream crossings (i.e., culverts) on the Forest. Prioritize repair and upgrade of culverts based on severity of risk of failure and cost.
- Identify areas with a high risk of fine sediment deposition (i.e., landslides), which would impact fish-bearing streams and prioritize for corrective action.
- Explore opportunities to learn more about the impact of fine sediment on aquatic species habitat and survival. Use floods as an opportunity to learn more about stream dynamics.

Issue

◈ **Risk of impacts by roads on stream channels and aquatic species depends on location, road age, type of surface material, and number of stream crossings.**

Current Situation

The degree of surface erosion from any particular road segment on the Siuslaw National Forest differs greatly depending primarily on the erodibility of the exposed surface; the slope of the exposed surface; and the area of the exposed surface that generates and concentrates runoff.

Risks and Benefits

The age of a road, surface material, number of stream crossings and drainage features, density of roads, and the percentage of a watershed that has been harvested (*e.g.,* hydrologically unrecovered) are all factors that can increase the risk of roads impacting beneficial uses such as fish reproduction, distribution, and survival. Impacts can occur chronically (*e.g.,* sedimentation from road and roadside run-off, fish distribution restrictions and alterations in stream channel morphology due to improperly sized or placed culverts) or as a result of significant episodic events, such as floods or catastrophic fires, that may lead to increased runoff and therefore impact water quantity and quality.

Desired Future Condition

The Forest's Ecosystem Restoration Strategy (USDA 2002) envisions "a stable adequately drained road system that provides access and allows for natural stream processes and passage of aquatic species." In particular, roads that pose high risks of damage to aquatic habitats would be in a treated or decommissioned state that minimizes those risks.

Recommendations

- Follow recommendations of watershed analyses and the Forest Restoration Plan (USDA 2002)
- Consider the following factors in determination of impacts on fish and other aquatic resources:
  - ⇨ Type, condition, and number of stream crossings at a road-segment scale.
  - ⇨ Road-segment interaction with a stream's floodplain, where the road is parallel to the stream.
  - ⇨ Road surface type.
  - ⇨ Culvert fill-failure risk.
  - ⇨ Sustained steep (>15%) road grades in excess of 500 feet).
  - ⇨ Percent of road with sideslopes >51%.
  - ⇨ Road maintenance records. At a minimum, a record of maintenance accomplished (date, type), including knowledge of site-specific chronic or severe maintenance sites should be documented.
  - ⇨ Documentation of known spawning reaches with review by state and other agency biologists.
  - ⇨ Track temporary road locations, construction, and decommissioning or obliteration. This information is required in ESA consultation, but is not currently tracked in the Forest road database, which tracks system roads. Responsibility for tracking these roads may not rest with the Forest Engineering Department.
- Explore opportunities to learn about specific fish runs in areas with high road densities. Consider partnerships with other agencies and stakeholders for more efficient and cost-effective analysis.

◈ Culverts of inadequate size or performance restrict passage of fish and other aquatic organisms.

Issue

Current Situation

Using a consistent Regional protocol, inventories completed in recent years suggest that most culverts at road-stream crossings on the Siuslaw National Forest block or impede migration of some life phases of various species of fish and other organisms. Although many resident aquatic species travel significant distances along streams throughout their life, both diurnally and seasonally, this situation probably has the most serious (though largely undocumented) consequences on anadromous salmonids (salmon, steelhead, and searun cutthroat trout) and lampreys.

Risks and Benefits

Most culvert blockages prevent or restrict upstream migration, though sometimes downstream migration through a culvert can also pose hazards to the fish from poor outlet conditions (e.g., high perch with no outlet pool). Blockages at the crossing may be partial or total, and they can affect adult spawners, migrating juvenile fish, or both.

Removal of such artificial barriers will provide each fish species with the greatest opportunity to capitalize on available productive habitat, and recovery of species like the coho salmon is dependent upon the ability of all life stages to move to suitable habitat.

In rare cases, maintaining barriers at road crossings is desirable where such barriers prevent invasions by unwanted aquatic species.

Desired Future Condition

The Forest's Ecosystem Restoration Strategy (USDA) envisions "a stable adequately drained road system that provides access and allows for natural stream processes and passage of aquatic species." In particular, nearly natural stream conditions (gradients, flows, substrate) extend through road crossings.

Recommendations

- Follow recommendations of watershed analyses and the Forest Restoration Plan (USDA 2002).
- Utilize the stream crossing inventory to identify all road-stream crossings (*i.e.*, culverts) on the Forest. Prioritize repair and upgrade of culverts based on risk of failure and impact to fish passage and other aquatic resources.
- Where fish passage is affected, use an interdisciplinary process in the design of culverts (*e.g.,* fisheries biology, engineering, geomorphology, hydraulics, hydrology).

Two views of the same culvert. Notice the culvert is large enough to accommodate high water flows. The rocks on the bottom recreate natural stream flows, which allow passage of aquatic organisms through the pipe.

Terrestrial Wildlife

The Forest road network can significantly alter wildlife habitats and negatively impact wildlife populations. The negative effects of roads on wildlife (including listed and sensitive species) can be classified into three general categories:

- **Edge effects and fragmentation;**
- **Barriers to species movement; and**
- **Disruption of activities such as breeding, feeding, resting or dispersal activities as a result of the use and maintenance of the road system.**

Current Situation

Edge effects are the result of the interaction between two adjacent habitats, when the two habitats are separated by an abrupt edge (Murcia 1995). The ecology of forest edges is characterized by changes in biotic (parasites, predators and herbivores) and abiotic (microclimate, disturbance regime) elements. If exposure to the edge modifies the features of the forest beyond their range of natural intrinsic variation, then that area will be effectively reduced for conservation purposes (Murcia 1995).

Forest **fragmentation** can threaten native wildlife populations by eliminating blocks of continuous habitat or by degrading the quality of remaining habitat for those species sensitive to an increase in the amount of forest edge. Currently, roads and the history of intensive timber harvesting are the major causes of forest fragmentation on the Siuslaw National Forest. The Assessment Report of Federal Lands in and Adjacent to the Oregon Coast Province (USDA 1995a) documents changes in the size and composition of patterns as a result of road construction and harvest activities. The report concluded that the large (1001-10,000 acres) and jumbo (>10,000 acres) scale disturbance regimes, which previously dominated the landscape, have been replaced by small (<100 acres) and medium (100-1000 acres) scale disturbance regimes. It also documents the associated loss of large blocks of isolated forest habitat favored by species such as fisher and wolverines. During the 1980s and into the early 1990s the continued decline in mature forest habitat led to listing of Northern spotted owls and marbled murrelets as threatened under the Endangered Species Act (ESA).

A second major impact of roads on wildlife is a **barrier to species movement**. The barrier effect is sensitive to both road width and traffic density (Forman and Hersperger 1996). As road width and traffic density increase, roads become more effective barriers to movement (Reudiger 1996). Roads create additional barriers to movement where the road shoulders and cutbanks create an over-steepened slope, and where undersized culverts bisect channels. When populations become subdivided, there is increased risk of demographic fluctuation, local extinction of subpopulations, less re-colonization after local extinction, and a progressive loss of local biodiversity (Soule 1987).

Finally, the extensive network of Forest Service roads also creates opportunities for **human activities** to impact terrestrial wildlife. In past decades, the Siuslaw road network was used to support timber harvest activities. As timber harvests declined, the road network continues to provide access for recreationists and hunters, impacting animals directly (*e.g.*, deer, elk, and bear) or indirectly (disturbance from roadside camping).

Generally speaking, human influences on the Forest are greatest near roads and decrease steadily with distance from roads. Noise associated with road maintenance and use can disturb the breeding, feeding and rearing behavior of sensitive species such as marbled murrelets, and Northern spotted owls. Through agreements with ODF&W (Oregon Department of Fish & Wildlife), some roads have been closed to reduce the impact of vehicles on elk feeding and calving areas.

Risks and Benefits

The effects of fragmentation will continue until plantations (either through treatment or natural process) begin to reflect the composition and structure of adjacent natural stands. As fewer miles of open road are maintained, the barriers associated with an active road system are limited to the Key Road system, or project roads during periods of active management. The remaining roads have become less of a barrier as vegetation has started to grow in them, fallen trees have remained in place, and culverts are removed during periods of closure. Chronic levels of disturbance from use and maintenance of the entire road system have been reduced as the total miles maintained annually have been significantly reduced. Disturbances will continue to occur as All Terrain Vehicles (ATVs) pass closure devices in an attempt to access closed areas.

Desired Future Condition

The Key Forest Road system is limited to those roads required to connect major areas of the Forest and adjacent communities. Roads closed or decommissioned are free of barriers during periods they are not used for major forest management activities. Roads closed or decommissioned are not a source of disturbance during critical breeding, or rearing periods.

Recommendations

- Close or restrict access to roads used intermittently for forest management activities.
- Decommission unneeded roads.
- Limit roadside salvage sales to the Key Forest Roads.
- Minimize the effect of noise from road maintenance, reconstruction or decommissioning by managing the seasonal and hourly operating periods of projects.
- Reduce the operation of ATVs (All Terrain Vehicles) and other vehicles on closed or decommissioned roads by using road closure devices and administrative regulations.

Vegetation Management

Issue

◈ **Maintain access to current or planned vegetation management projects.**

Current Situation

The Siuslaw National Forest is virtually all in a Late Successional Reserve (LSR) or Riparian Reserve (RR) Land Use Allocation under the Northwest Forest Plan. Matrix lands receive the same treatment as LSRs and RRs due to their small size (under 10 acres) and scattered distribution on the landscape.

Natural stands on the Forest are primarily composed of 100 to 150 year old Douglas-fir stands and scattered, relatively small patches of remnant old growth. These stands originated following the last large fire in the coast range, the Yaquina Fire in 1850. Thus, most of the current natural stands are in a mid seral stage. It's estimated that less then 10,000 acres of late successional forest survived this fire and subsequent harvesting.

Harvesting during the past 50-60 years has resulted in a highly dissected landscape. About 40% of the Forest is comprised of dense, uniform Douglas-fir plantations (10 to 100ac), resulting from intensive reforestation after harvest.

The Northwest Forest Plan indicates that active management of these plantations is important to restoring late successional forest conditions throughout the LSRs. Silvicultural activities promote diverse stand structure by manipulating stand density and establishing shade-tolerant species in the understory.


Stabilized, closed road.

Most remaining natural stands exceed 80 years of age, beyond which stands are not treated under the Northwest Forest Plan. Therefore, access to these older stands is not an issue.

The type of road access and maintenance level is a major factor in determining the type and intensity of stand treatment. For example, where roads are absent or decommissioned the cost to harvest and treat stands is increased. Additionally, these stands require longer duration and higher intensity silvicultural treatment. Stands adjacent to Key Forest Roads, however, are managed assuming access to the stand will be available in the future, allowing frequent, low intensity silvicultural treatment.

The Forest Restoration Plan (USDA 2002) prioritizes watershed restoration activities, including silvicultural treatments, to concentrate management activities over a short timeframe followed by a period of minimal management. During the latter, roads can be closed for a period of time (one year or longer) and later re-opened for silvicultural treatment.

Risks and Benefits

The current road system provides access to most of the stands requiring silvicultural management on the Forest. However, as more roads are closed or decommissioned, silvicultural activities may be limited or precluded due to higher unit costs.

Desired Future Condition

A limited Forest road system maintains access to stands less than 80 years old in order to allow silvicultural treatments to develop late successional conditions. Once this condition has been achieved, access to stands is no longer needed and non-Key Forest Roads are decommissioned.

Recommendations

- Identify and maintain key access points to accommodate equipment needed for thinning stands.
- Focus treatment on stands accessible from the Key Road system and other hydrologically stable roads (*e.g.,* ridgetop roads). Roads that will be decommissioned may be used for silvicultural treatment prior to decommissioning.
- When closed roads are reopened, use minimal impact techniques. For example:
  - ⇨ Keep clearing width to a minimum.
  - ⇨ Avoid sidecasting clearing debris and rootwads.

- Provide temporary drainage such as waterbars for wet areas (*e.g.,* seeps, springs). Reestablish natural drainage prior to road closure.
- Match road design with season of operation (*i.e.,* rock to support winter haul; rock north slopes when hauling during rainy season).

Issue

◈ Roads and associated human activities increase the spread of noxious weeds.

Current Situation

Roadside areas throughout the nation frequently support an abundance of non-native invasive plants (weeds). Weed abundance in these areas is often attributed to three factors:

1) Level of initial disturbance from road construction resulting in extensive areas of mineral soil and exposed parent material that provide ideal sites for weed colonization;
2) Frequent disturbance regimes as a result of regular road maintenance and use that provide opportunity for additional weed colonization and expansion of established populations; and
3) Vehicles traveling the roads and other human activities along road corridors often transport weed seed or propagules into the area (Baker 1986).

Roadside areas of the Siuslaw National system roads currently support substantial populations of non-native invasive plants. Weed surveys conducted during the summer of 2002 as part of an ongoing weed inventory project found that as much as 95 percent of the roadsides surveyed supported some level of weed infestation (Segotta, personal communication).

Risks and Benefits

The risk of weed introduction and spread posed by roads is a function of road use and maintenance level, and the proximity and biology of individual weed species. Weed species found along forest roadsides generally fall within three risk categories.

Category I (Low Risk) – Common weed species with short-term occupancy (or frequent disturbance)

These species are found along most roadsides on the Forest and are generally dependent on frequent disturbance, such as road maintenance, for long-term site occupancy. Dispersal mechanisms and vectors for seed transport of many of these species is wind. However, road traffic, maintenance machinery and other human uses contribute to seed transport and spread. Some species in this category are listed on the Oregon Department of Agriculture's Noxious Weed List. Examples of plants in this category include tansy ragwort, bull thistle and Australian fireweed.

Risks associated with weed species in this category are generally low. Benefits of initiating new management actions to contain or control spread along roads would be minimal.

Category II (High Risk) – Common weed species with potential for long-term site occupancy

These species are found along many roadsides on the Forest (estimate is 35-40% based on 2002 inventory work). Once established, they are not dependent on frequent disturbance for long-term site occupancy. Vehicles, heavy equipment, and other human activities (yard waste disposal, animal feed, contaminated seed) have been documented or are suspected as long-range vectors for spread of many species in this category. Once established, these species have potential to disrupt natural successional pathways of forest vegetation. Most species in this category are listed on the Oregon Department of Agriculture's Noxious Weed List. Examples of plants in this category include Scotch broom, Himalayan berry and Evergreen blackberry.

Scotch broom

Risks associated with weed species in this category are high. Initiating management actions to contain established populations and prevent weed spread along roads would be beneficial. Implementation of management actions along primary and secondary roads traversing areas of the Forest where these species are not present, such as the Mary's Peak Scenic Botanical Area, would provide the greatest benefits.

Category III (Very High Risk) – Uncommon weed species with potential for long-term site occupancy

These species are found or suspected in only a few locations on or adjacent to the Forest. Once established, they are not dependent on frequent disturbance for long-term site occupancy. Vehicles, heavy equipment, and other human activities (yard waste disposal, animal feed, contaminated seed) have been documented or are suspected as long-range vectors for spread of many species in this category. Once established, these species have potential to disrupt natural successional pathways of forest vegetation. These species pose the greatest threat of spread along forest roads with potential adverse effects to ecosystem function and natural processes (Miller, personal communication). All species in this category are listed on the Oregon Department of Agriculture's Noxious Weed List. Examples of plants in this category include purple loosestrife, Portuguese broom and gorse.

Risks associated with weed species in this category are very high. Initiating management actions to contain and control established populations and prevent the spread of weeds in this category along roads is critical to maintaining ecosystem function and resource values. Measures to contain known infestation sites and prevent the spread of weeds in this category have been implemented in some areas where primary and secondary roads traverse known infestation sites. New infestations and new species that fit this category and further increase risk are anticipated in the future (Steinmaus 2002).

Most risk of weed infestation is associated with primary and secondary roads that are regularly maintained for public use and new construction of "temporary" roads associated with timber harvest activities. Closed roads and roads that are not regularly maintained (storm-proofed and allowed to "grow-in") pose a relatively low risk of weed infestation to category II and III weeds (Parendes 1997).

Desired Future Condition

New detections of category II and III weeds show a decreasing trend annually with no increases in percent cover of weeds along roadsides. Weed prevention measures are incorporated into all project planning and implementation including timber sales, service contracts, construction contracts, special use permits and force account work. Site-specific management plans are in place to contain, control and prevent the spread of category III weeds as new sites and/or species are detected.

Recommendations

The following weed prevention measures for road corridors should be considered and, where applicable, included when planning and implementing work (USDA 2001a).

- **Equipment cleaning** – Require equipment cleaning for:
  - ⇨ All equipment brought onto the Forest;
  - ⇨ All equipment moved from infested areas (category II and III weeds) to uninfested areas; and
  - ⇨ Equipment moved from anywhere into an uninfested sensitive area (such as Mary's Peak).

  Equipment cleaning should apply to all contract, force account, cooperator and special use equipment and would apply to tractors, mowers, graders and other equipment including vehicles and ATVs that have been used off the road surface.
- **Competitive seeding** – Seed disturbed sites lacking canopy cover using native species seed mix. Consult with Forest botanist for current seed mix, seeding window and fertilizer prescription.
- **Maintain Canopy Cover** – Maintain existing canopy cover to the extent possible when designing new roads or marking clearing limits for temporary roads.
- **Certified Weed free Seed** – Use only certified weed-free seed for roadside revegetation. Seed purchased should be tested using the All States Noxious Weed List.
- **Weed-Free Rock Sources** – Consider development of a quarry certification program and use only weed-free rock sources for road construction and maintenance.
- **Close roads** – Close Forest roads not needed for the foreseeable future. Gated roads and roads that are storm-proofed and allowed to grow-in are at a much lower risk for weed invasion and transport than maintained roads.
- **Quarantines** – Consider the use of Oregon Department of Agriculture quarantines (ORS 561.510 & 561.540, 2001) if needed for new weed species or plant pathogens.
- **Inventory** – Conduct annual weed inventory of the Forest road system and maintain a current GIS weed inventory layer available for use by project planners and implementation personnel.
- **Internal and External Weed Education** – Address weed issues during school presentations and interpretive walks. Provide increased awareness of weed issues and prevention methods within the Forest Service workforce through training sessions and presentations during workforce meeting.

Social Issue

Wildfire Occurrence and Suppression

◈ **Roads influence wildfire occurrence and suppression by increasing human access to the Forest.**

Current Situation

Road systems within the national forest system, serve a very important purpose in the suppression of wildfires. Fire Regimes are based on frequency and intensity of wildfires across the land base. Areas with a long fire return interval of hundreds of years are usually high intensity stand replacement events over a large-scale area and occur during the most severe dry weather patterns for those areas. Road systems can affect the response time to “initial attack” fires and can make the difference whether or not these fires become extended attack project type fires. In addition, the road system increases access to humans, thereby increasing the incidence of human caused fire ignitions.

On the Westside of the Siuslaw National Forest, the fire suppression effort is a cooperative effort between Oregon Department of Forestry (ODF) and the US Forest Service (USFS) working under a cooperative agreement. When the USFS decommissions roads, that action can affect the ability of cooperators to access lands for which they have fire protection responsibility. These roads need to have ODF oversight and agreement.

In general, roads have to be evaluated on a case-by-case basis while maintaining the big picture, sub-basin approach. On the Westside, if we can limit public access, we normally can limit the risk of human caused wildfires. However, in the event that we do incur fires with poor accessibility, the risk of a catastrophic event occurring is greatly increased.

Risks and Benefits

The majority of fire ignitions are human caused, as lightning is a rare event or is accompanied by rainfall amounts that keep fires small. The level of public access to the Forest is commensurate with the risk of a fire ignition during severe fire weather conditions. Access that allows the public to drive over waterbars, but hampers access by fire equipment is the worst-case scenario. Roads that are gated or block public access during fire season, but still maintain access for administrative use in order to fight wildfires are the best-case scenarios. However, funds for the best-case scenario transportation systems are not available and wildlife and hydrologic systems do not benefit from maintaining a high road intensity level.

Roads provide access to fire engines

Another risk is that the amount of commercial thinning on the Siuslaw is creating an increase in fuel loading above historic levels without generating a level of funding to properly treat hazardous fuels on the ground. Therefore, any fires that do occur in unroaded areas, or areas where we have decommissioned the road system, have the potential to become high intensity fires and delay stands from reaching the desired late seral stages of development.

Risk to the public in areas with poor accessibility could result in higher property damage and a greater risk of the fire spreading to national Forest lands. Dead-end roads are a high risk to firefighter safety as the escape routes are very limited. These areas also need to have agreement with our cooperators concerning any road decommissioning that could affect their ability to provide adequate fire protection.

The amount of road system left intact and accessible is a real key to the fire suppression effort, especially where adjacent private landowners are in the process of harvesting their lands or have the potential to harvest their lands in the future. The majority of these lands are located in the valley bottoms with national Forest lands above them on the ridge tops. Thus, the road system positioned on ridge tops soon become the best alternative for firebreaks and control lines.

Desired Future Condition

The Key Road system is maintained to a high standard that provides safe access for fire suppression crews and equipment. Ridgetop roads are maintained and regularly cleared of brush for potential use as fuel breaks.

Access to water in the stream bottoms is maintained. Road systems that lead to these areas are identified in pre suppression plans and maintained as a key component of the fire suppression effort. Suppression actions are undertaken quickly and initial attack objectives minimize the amount of acres burned.

Recommendations

- Roads determined to be Key Forest Routes should be maintained at a high level for quick response of emergency vehicles of all sizes and visibility for safe travel.
- Identify key water sources at the district level and maintain road access to these key water sources.
- Consult with suppression cooperators when determining which roads to close or decommission.
- For Firefighter Safety: Roads accessible by fire equipment should be accurately mapped and signed, and this information provided to firefighters to support effective suppression/pre-suppression strategies and avoid potential entrapment.

  This information should also reside in the Forest Geographic Information System (GIS) for use at the appropriate scale based on fire size and location.
- Ridgetop roads should be maintained to serve as firebreaks and control lines.

Road access assists wildland firefighters